



## Semantic Annotation Workflow using Bio-Ontologies

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# Introduction

Biologists have adopted ontologies:

- To provide canonical representation of scientific knowledge
- To annotate experimental data to enable interpretation, comparison, and discovery across databases
- To facilitate knowledge-based applications for decision-support, natural language processing, and data integration

But **off-the-shelf solutions for the biologist** to use ontologies are rare (versions, format, availability, license, overlap, etc.)

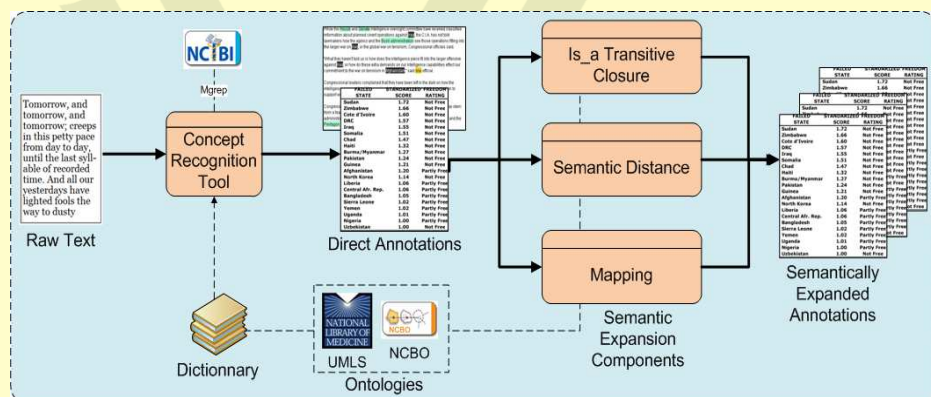
## The challenge

Automatically process complex biological resources text content and generate annotations :

- Large-scale – to scale up to many resources and ontologies
- Automatic – to keep precision and accuracy
- Easy to use and to access – web service approach
- Customizable – to fit very specific needs
- Smart – to leverage the knowledge contained in ontologies

There have been **success stories to reproduce**: GO annotations, PubMed indexing, etc.

## NCBO Annotator: Ontology-based annotation workflow



- First, direct annotations are created by **recognizing concepts** in raw text.
- Second, annotations are **semantically expanded** using knowledge of the ontologies.
- Third, all annotations are **aggregated and scored** according to the context in which they have been created.

## Customized IBC Annotator for database schemas

## BioSemantic

### Rich internet application



Convert SQL database  
to RDF/RDFS  
Upload it to NCBO Platform  
for annotation



## WebSmatch

Use WebSmash matching techniques to find mapping for Entities/Instances.

## Web service calls



Ontologies stored and indexed by NCBO platform



## NCBO platform

## Ontologies database

- Convert **SQL database schemas to RDF/RDFS** with BioSemantic
- Annotate with NCBO Annotator and WebSmatch using customized NCBO services
- **Annotator relies on WebSmatch** to create mappings between elements of schemas and ontological concepts
- **Indexing IBC related data** with the workflow to enhance semantic search and mining of data

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